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Blockchain: a catalyst in fintech future revolution

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ABSTRACT

Blockchain technology is a trending subject of research and development. As a result of the blockchain proof of concept, the banking industry also accepted the technology and altered the fundamental financial concepts. In the Fintech sector, difficulties such as missed objectives, lengthy fund-raising cycles, and rising losses are typical, and they often happen as a result of not strong management. Blockchain has created inclusive, open, and secure corporate networks that enable the rapid issuance of digital security at lower unit prices and with a higher degree of customization. In recent years, blockchain technology has evolved in the financial sector, exhibiting numerous benefits. According to analysts, blockchain technology will help the banking industry become more accessible, efficient, secure, and user-friendly in the upcoming years. This article reviews how blockchain technology is employed by the financial services industry and also the applications of blockchain, as an emerging field, in Fintech to find new gateways for this field.

1. Introduction

Fintech, a combination of "finance" and "technology," is a contemporary phrase in the financial industry. Traditional financial service providers, such as banks and insurance companies, are also included. Technology facilitates innovation in financial products and services, which improves business models and procedures and has an impact on the growth of the financial industry and the availability of financial services. Customers' requirements dictate the direction of financial technology development. Most Fintech companies concentrate on peer-to-peer lending, stock trading, cryptocurrency trading, and other elements of finance [1]. Since the 19th century, considerable technical advances have occurred as a result of efforts to improve customer service. While rising consumer expectations play a role in the advancement of the Fintech movement, the global economic crisis has been a crucial motivator for enhancing the movement's passion. In the previous century, seven cataclysmic crises shook the globe, with the most recent one in 2008 serving as the last blow to the financial industry's technological foundation [2]. The pandemic Covid-19 virus has inaugurated a new era of financial technology. The disease's rapid development has prompted individuals to actively adjust their daily activities, which has expanded the use of financial technology. An estimated 21% to 26% increase in daily downloads of Fintech mobile apps may be attributable to the spread of the disease [3]. Annual trade volumes for digital payment and virtual currency platforms increased by more than 20%, while online banking and identity management increased by around 10% [3]. Globally, Fintech enterprises are growing in popularity. As banking and

other financial services become more digitized, competition will be raised too. Comparatively, just 2.6% and 3.3% of companies in the aviation and insurance industries invest in IT; however, 4.7% to 9.4% of companies in the banking industry do the same [4]. Digital finance's expanded financial intermediation affects both consumers and the economy. A decade of research on the link between money and technology has produced unexpected results [5]. Satoshi Nakamoto, an unidentified Japanese computer engineer, developed Bitcoin in 2009 as a cryptographically secure distributed ledger system for recording financial transactions [5]. These developments in Fintech have opened up the opportunity for an abundance of new firms with boundless potentials. Venture capitalists and the credit markets are commonly the primary sources of funding for Fintech companies. Fintech companies are more widespread in countries with flexible financial rules [6]. Fintech success is dependent on the amount of money provided by venture capitalists. The \$128 billion spent worldwide on Fintech in 2017 is expected to climb to \$310 billion by 2022. In the next three to five years, traditional financial institutions will employ real technology to enhance customer retention [7]. Innovative technological advancements and web-based services provide financial institutions with serious competition. A lot of these innovative financial services would not exist without the contributions of Fintech companies. They compel banks to assess their constraints and explore more open forms of collaboration [8]. The banking sector has responded to this potential threat by forming strategic partnerships with Fintech companies and using their services. Banks have built Fintech incubators to stimulate

innovation while maintaining control over other new companies that may emerge [9]. In contrast, P2P Fintech does not put banks at risk of security issues [10]. A considerable majority of customers continue to emphasize bank security while doing financial transactions. The blockchain serves as the backbone of financial technology. Bitcoin, the first cryptocurrency, was created in 2008, ushering in the Blockchain era [4]. Blockchain has gotten a lot of interest, investment, and research because of the problems it solves, the trust it builds, and the transactions it makes possible. With the help of blockchain technology, traditional banking processes are being changed into completely open systems, and success depends only on how well they work. If blockchain is used correctly, it could help build a digital economy and change the financial industry. This technology will allow completely decentralized and authority-free peer-to-peer transactions. In other words, blockchain simplifies international financial transactions. Using blockchain technology, the average cost of transferring funds between accounts will be 3% which is considerable compared to 10-15% charged by banks [11]. The Blockchain & Cryptocurrency industry surpassed other industries in the first half of 2022, accounting for one-fifth of all agreements with 704 transactions out of a total of 3,447. In the second quarter of 2020, blockchain and virtual currencies were used by 2.5% of the world's population, and by the second quarter of 2021, that number had risen to 24%. As long as new technology and innovations are introduced, acceptance and growth will continue. WealthTech raised the most capital in the first half of 2022, with \$13.9 billion, or 18% of the total \$76.8 billion raised in global Fintech transactions (Figure 1) [12]. In the last decade, there has been an increase in transformation in digital banking, which has increased the number of available trading options and provided users with the opportunity to handle their assets independently. Due to the immutability and transparency of blockchain transactions, the financial industry stands to benefit tremendously from this technology.

Due to the novelty of the technology and the lack of an international regulatory framework, its security may be a concern. Even though blockchain has existed for a decade, it is still a relatively new technology; therefore, susceptible to technological limitations. The inefficiency of the technology to achieve its full potential is hindered by the lack of appropriate legislation. There are several applications for blockchain technology in the financial industry, but its boundaries in other industries are still being researched [11]. Since blockchain is an emerging field and has received little attention in Fintech, this article reviews the applications of blockchain in Fintech to find new gateways in this area.

2. Decentralized Finance

Decentralized finance, or DeFi, is a relatively new method of funding that excludes traditional financial institutions. To achieve this, it leverages a blockchain-based architecture that is unique from the usual one. Ethereum has served as the primary foundation for several blockchain projects [13]. DeFi methods eliminate the intermediary in financial transactions, which may be beneficial for diversifying loan portfolios, growing individual investments, and managing day-to-day finances. Gains on DeFi financial products are intended to augment, not replace, conventional advantages. Some DeFi offers to promote high-interest securities to attract investors. Increases in funding for DeFi systems have exceeded \$11 billion [14]. The development of DeFi was made possible by three major and practical technologies: Moore's law, Kryder's law, and the third law, whose name is still unknown. Moore's law asserts that computing power increases exponentially as the number of records that can be processed concurrently increases. Kryder's rule holds for archival storage space as well. Thirdly, DeFi is already a reality due to the exponential expansion and declining costs of the communications sector [14]. Despite claims to the contrary, DeFi has numerous downsides. Legally speaking, DeFi endangers monetary systems since it seeks to supplant the regulating activities of institutions. Any DeFi adoption raises digital dangers due to technological dependence and interaction.

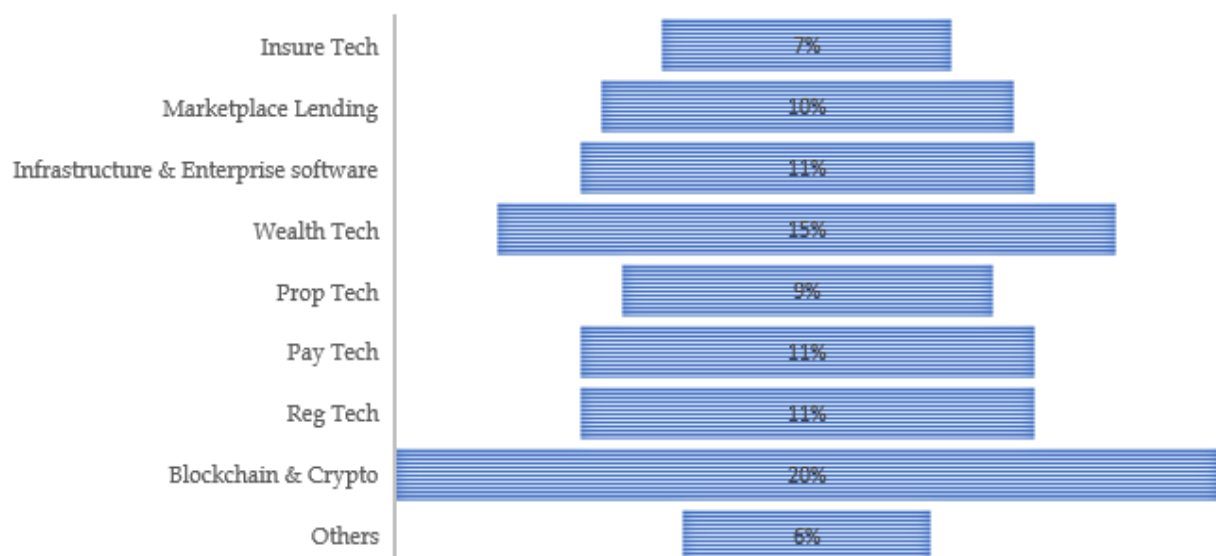


Figure 1. Global Fintech deal in the first half of 2022, adapted from Global Fintech [12]

Without monitoring, the sector is very dangerous and prone to fraud. In 2021, DeFi network hackers accessed nearly \$10 billion. DeFi applications are rapidly becoming a far more realistic means of stealing money [15].

2.1 Cryptocurrency

As a consequence of the increased usage of cell phones and internet services, several novel techniques for completing financial transactions have evolved. In 2008, Satoshi Nakamoto released the initial version of Bitcoin on a mailing list maintained by cryptographers, ushering in the blockchain age [16]. In contrast to the majority of fiat currencies, neither the government that issues it nor the business that endorses it guarantees its value. Recently, demand has increased in this industry. Businesses may get financing without seeking venture capitalists, and the resulting shares are not required to be published on a public market. Regarding the cryptocurrency market, there are two distinct viewpoints: one believes that the vast majority of coins are fake and expensive, while the other says that cryptocurrencies represent an innovative concept that should be regarded as an asset class [17]. Utilizing a cryptocurrency necessitates a cryptocurrency wallet, which holds a randomly generated address. This address may be used to produce a public key. The wallet also includes a private key, which may be used to authenticate your identity and the validity of your transactions. The public key of the receiver is used to authenticate the sender's payment at the recipient's address. The mining procedure guarantees the legitimacy of the transaction. The miner verifies each transaction's digital currency to confirm its validity and prevent double-spending. The blockchain records who have the money. To entirely exclude the possibility of fraudulent behavior, miners must perform a computationally intensive procedure. In this circumstance, just two instances of valid activities serve as evidence of stake or effort. This step keeps the number of validation actions under control. This is because each block mined generates a whole new currency [18].

2.2 Remittance

A remittance is money received overseas and returned to the native nation of the sender. These actions might be classified as either official or unofficial [19]. The government has authorized international banking. A bank may provide services in areas where it does not have a branch by forming a long-term partnership with another bank. The creation of blockchain technology occurred independently of and in opposition to the current monetary system. Since their inception, cryptocurrencies have made progress toward the systematization of remittances and economic development. They have developed a stable path for international trade. International transfers were one of the intriguing applications of cryptocurrencies [20]. Instantaneous payments and immutable public audit trails are provided by cryptocurrencies and distributed ledger technologies. Standardization converts remittances into marketable equities via the imposition of processing fees, the commercialization of customer data, and the further integration of such transaction channels into complicated monetary solutions [21].

2.3 Smart Contracts

Smart contracts are transforming business operations across several sectors. By integrating smart contracts into blockchains, agreements may be executed under their terms without the need for a third party. Distributed ledgers simplify the storage and modification of smart contract data

[22]. Decentralized apps and DeFi systems with robust smart contract capabilities may expand to a billion active users and hundreds of millions of daily activities at very cheap service costs. In a real-world Fintech application, an insurance firm and a farmer employ smart contracts. When the farmer fulfills a contractual commitment, the insurance provider must compensate him. The bitcoin payment is sent directly to the recipient's wallet. Ethereum is a decentralized platform that facilitates the execution of smart contracts. Smart contracts are transformative for IoT innovation. Today, the bulk of businesses still depend on centralized infrastructure for their IoT networks. To save time and money, developers may include software update hashes to smart contracts that are then distributed over the network. Using smart contracts may reduce investment risk, operating costs, and service quality. The extended settlement periods have harmed conventional stock markets. Due to the ability of smart contracts to cut settlement length from twenty days to only one week, it may be possible to increase client satisfaction. Smart contracts are essential to the security of any reliable system. The cloud computing application is one of its many use cases. In cloud computing, the data is saved and validated on the servers. The data is readily compromised if the third party is attacked or compromised. Smart contracts are based on the concept that a user may make a request to two distinct cloud servers and have them both do the identical action. Since contracts are in place, dishonesty is less likely to occur. Even if the field of smart contracts is evolving rapidly, there are still several issues to be resolved [23].

2.4 Know-Your-Customer (KYC)

In the financial industry, "know your customer" refers to a set of criteria for validating customers' identities and income levels. Blockchains utilize digital fingerprints to verify the identity of the user. Every online transaction would have its unique digital fingerprint if a distributed ledger and identity verification-based identification system were deployed [24]. KYC procedures, which focus on making sure the customer can be identified, are the core of every financial institution. KYC protocols will be important in the endeavor to integrate legal identity management with confidentiality precautions as a growing number of financial applications transition to blockchains. Know your client is based on document authentication checks, photo identification checks, and facial authentication checks. Due to the combined risks of financial fraud and theft, institutions need to simultaneously comply with many KYC regulations while also protecting the privacy of their clients. Fintech has offered several viable options that meet KYC's legal and privacy requirements while promoting accessibility. In addition to an increasing number of conventional banks, every Fintech company is becoming digital. KYC uses cutting-edge artificial intelligence to expedite criminal background checks on clients and enable mobile/portable device banking access. KYC has several advantages, but it also has certain disadvantages. Digital approaches need hardware and software that are reliable. Inadequate financing for system maintenance and improvement has led to a decline in the quality of treatment provided to patients [25, 26].

2.5 Non-Fungible Tokens (NFT)

Non-fungible tokens, or NFTs, are digital tokens that are rare, unique, and incapable of being traded on a public blockchain. However, they are all kept in digital ledgers; they are not just images. This digital asset shows real-world media, such as films, songs, and works of art. They are unique and cannot be reproduced under any circumstances. NFTs are

widely used for the purchase and sale of digital artwork. NFTs depend on a variety of blockchain platforms, but the blockchain itself is the essential component. With the introduction of second-generation blockchains such as Ethereum, software development and deployment are now conceivable. The ERC-20 standard enables the trading of fungible tokens, such as cryptocurrencies. These new currencies, also known as NFTs, use the ERC-721 protocol since they cannot be exchanged for other tokens. To discriminate between fungible and non-fungible tokens, a new protocol was required [27]. There are several business models for NFTs. This indicates that artists no longer need to sell their work via traditional channels such as galleries and auctions. They may instead sell it straight to clients as a NFT and retain a larger percentage of the revenue. There are probably more methods to get income from NFTs without selling artwork. Businesses may experiment with novel operational strategies, improve the quality of their existing products, and grow as a result. They provide new internet commerce and project participation platforms. All major corporations, including those in the multimedia business, will make a large investment in this area [28]. The blockchain is the foundation for many cutting-edge technologies, including NFTs, smart contracts, and cryptocurrencies such as Bitcoin. The Bitcoin industry has already suffered the repercussions of NFTs, and they are now beginning to extend to the Fintech industry. The development of decentralized banking may rely on non-fiat currencies. NFTs make it possible for Fintech companies to employ well-established crypto funding mechanisms, such as token IPOs, to get access to the cryptocurrency market or launch decentralized finance firms [29]. NFTs and DeFi will supply innovative Fintech together [30]. Although using NFT technology has resulted in various advantages, there are also disadvantages. NFTs were vulnerable to the same kinds of hacking that may harm any technological system. Money laundering is a possible concern [28].

2.6 Web 3.0

The next iteration of the internet, known as Web 3.0, encourages decentralized protocols and aims to lessen reliance on significant technical corporations. Web 1.0 was a simple idea that introduced the world to the Internet. For Web 1.0, just basic writing and reading abilities are needed. The read/write protocol, sometimes referred to as Web 2.0, has been made available. Internet users were first happy with the new capabilities, but over time they came to understand more about how their data was being used for commercial purposes. The latest version of the Internet, known as "Web 3.0," allows users to "read," "create," and "own" their material (www) [29]. In Web 3.0, cryptocurrencies are used to verify ownership of decentralized protocols. This permits the diffusion of collaborative frameworks for traditionally centralized products. Simply described, Web 3.0 refers to the semantic web. It is both an excellent example of how a database might be used to radically modify the web and an essential element of such a web. As a consequence of the advent of blockchain technology and new online releases, society is evolving toward dynamic web connections powered by artificial intelligence [31]. Web 3.0 signifies a major shift in the use of the internet and associated technologies. Anyone is invited to engage in a Web 3.0 decentralized environment, and the greater the number of participants, the greater the overall success of the project. Before the third phase is completely implemented, companies must decide on the necessary Internet modifications; otherwise, they will be

unable to satisfy client expectations. DeFi is a web 3.0 peer-to-peer network that provides consumers with easy access to blockchain-based financial services. Web 3.0, which focuses on financial technology, will usher in a period of significant change [32]. As a consequence of the rapid expansion of the financial and technical sectors, several new businesses have developed. Because of the emergence of new technologies that have the potential to alter the future of banking, settlements, and cryptocurrencies, there is increased pressure on businesses to reevaluate their products and economic strategies [33].

2.7 Metaverse

In the metaverse, users inhabit a digital environment that combines virtual reality, augmented reality, and other media kinds. Web 3.0 will be the future basis of the metaverse. In this new economy, which will be driven by blockchain-based distributed applications (dApps), users will have control over their digital currency and data [34]. The term "metaverse" is attributed to science fiction/fantasy author Neal Stephenson, whose 1992 book "Snow Crash" included live avatars interacting with authentic 3D architecture and other VR settings [35]. The roadway is susceptible to change, just like every other location on earth. The main highway may serve as the beginning point for investor-built connecting roads. They may create artificial buildings, amusement parks, and billboards, among other things. Many things can be found in the Metaverse, from social gatherings to competitive games [36]. Users of the Metaverse are required to wear a VR headset and connect to the VR control panel. It is essential to note that in a variety of online games and scenarios, you may even own and sell virtual items. In addition, there is no single organization or team responsible for constructing the metaverse.

Long term, several diverse virtual environments produced by different teams will be interoperable. If two virtual worlds are linked, the blockchain can verify ownership of digital assets in both. Users may purchase digital money so long as they have access to their bitcoin wallets [37]. The metaverse can alter service delivery via the use of cutting-edge technology and innovative solutions, which have revitalized the financial sector as well as many others. New metaverse business models might make it possible for cryptocurrencies to become a powerful alternative currency. During the global Covid epidemic, video calling was used to connect geographically scattered workers, announcing the impending arrival of the subsequent developments. Fintech services, which offer a virtual counterpart to conventional banking tasks like account management and transaction processing, are often seen as an essential aspect of the metaverse. The metaverse may provide more purchasing opportunities than entertainment alternatives for the average client. Fintech businesses are capitalizing on emerging financial needs, and many entrepreneurs are producing digital products based on well-known literary characters [38]. Banks must collaborate with Fintech companies and profit from their innovations to flourish in the coming metaverse virtual world. Indeed, banks and other financial organizations in Korea have begun to construct customer-facing, interactive virtual worlds [39]. By using this metaverse implementation as a learning environment, experts in the financial business may have gains. The financial industry will be changed by technologies such as blockchain, cryptocurrencies, NFTs, and the metaverse [40].

3. Development in Different Fintech Segments

Banks are entering a new era due to the expansion of Fintech. Executives in charge of the global financial markets have a huge difficulty in this mostly uncharted sector [41]. Despite advances in timeliness and quality of financial services [42], digital cost reductions remain to represent the promise of Fintech. Due to advancements in financial technology, business owners may now get funds and conduct transactions online. Regardless of time or place, the online marketplace may be a very useful instrument for doing commercial transactions in the agricultural sector [43]. By giving customers access to financial services through mobile apps, organizations have built ingenious client engagement tactics. Utilizing cutting-edge blockchain and artificial intelligence technologies is an efficient method to save costs and increase production. The transaction settlement services provided by Fintech companies are highly advantageous [44]. Internet services, especially in developing countries, have contributed to the growth of Fintech. This section will discuss how development is occurring in different segments of Fintech.

3.1 Financing

In the last decade, there has been an explosion in the number of Fintech businesses. Due to technology improvements, several investors now have access to a new funding stream. By eliminating the need for a trusted third party (or central server), the deployment of blockchain technology in the financial sector might provide investors and business owners with new tools for the frictionless flow of data and resources [20]. Crowdfunding and crowd-investing are unquestionably among recent global phenomena. In 2015, it produced global revenue of \$34 billion [45]. Crowdfunding platforms enable startups and other enterprises to generate capital by selling ownership stakes to the general public. Governments have responded by developing criteria for how enterprises might safely seek initial capital. The bulk of funds on crowdfunding platforms are contributed by inconsequential people who have no real input in how a firm run. Many firms of this type do not last a long time. The initial public offering is a further method of financing (IPOs) that normal investors no longer have access to [46]. Initial public offerings (IPOs) may produce hundreds of millions of dollars or more; however, crowdsourcing is often used to finance startups [47].

3.2 Asset Management

Financial technology businesses are implementing extensive adjustments to the digital infrastructure. Hiring a trained asset manager is a practical way to maintain financial control and grow the portfolio. Robotic advisors are a prevalent illustration of how rapidly technology is advancing in the present day. The term "Robo-advisor" refers to a kind of financial advisor capable of managing investment portfolios. This new strategy is less costly and more effective than previous methods. Robo-advisors often charge a predetermined annual fee of less than 0.5% to manage their money [48]. Fintech has contributed to a time of tremendous expansion in the financial services industry. Social trading allows users with a rudimentary understanding of finance to imitate the actions of more seasoned traders [49].

3.3 Payment

The payments industry is one of the dynamic Fintech sectors. Since these developments, there has been intense rivalry among banks. Peer-to-peer lending, digital banking, bitcoin, and the expanding mobile payments sector are among

the new financial services made possible by the merger of finance and technology [50]. Electronic payment is processed via a payment gateway. With the advent of internet shopping, the significance of electronic transaction technologies has also increased. In response to the rise in mobile phone use, the digital payment system has been improved. Only as a mechanism to provide safe online transactions the notion of cryptocurrency has been formed [51].

4. Future Perspective

The fast worldwide expansion of Fintech may be attributed to a multitude of factors, including changing consumer views and attitudes, improving financial technology, and increasing governmental permission. The company's future depends on distributed computing. Customers may now do a variety of financial transactions from the convenience of their mobile devices and owing to Fintech which improves customer service [28]. An increasing number of customers will tolerate substandard service and unethical business methods. It is essential to recognize that although technological advancements undoubtedly enhance our quality of life, they also pose several risks, such as the rising possibility of data breaches and other sorts of theft. The banking sector utilizes cloud services to improve quality and efficiency, but this creates new security risks. Numerous Fintech businesses from across the globe are working to discover a solution for blockchain adaptation to empower clients with data ownership and reduce their reliance on middlemen [52]. This new area of study may have an effect on the banking and finance industries. The possibility for digitizing and betokening a company's assets would unquestionably need a shift in corporate strategy. Using blockchain technology's revolutionary ways of financial operations that respect the limitations of openness and dependability, a decentralized financial system is being constructed [11]. Given the sector's rapid adoption and deployment of technology, the future of Blockchain in financial technology appears optimistic. The blockchain-based Fintech industry is anticipated to reach USD 6,700,63 million by 2023, rising at a CAGR of 75.2% from 2018 to 2023 [53]. Applications using blockchain technology will cause a financial storm. Eventually, the advantages of this system will extend beyond traditional banking to non-banking financial services such as asset and wealth management. To create industry standards for productivity gains, cost savings, and satisfied customers along the whole value chain, financial institutions of all sizes would be beneficial to seek guidance on how to properly integrate and use this cutting-edge technology into their business model.

5. Conclusion

Blockchain technology is likely to change the financial services sector and the whole economy, despite its immaturity and technical, economic, and regulatory challenges. In a decentralized system, cryptocurrencies play a crucial role. Companies in the financial technology industry are developing a compliant technique allowing users to utilize bitcoins for P2P transactions. Authorities are beginning to understand the relevance of blockchain technology, even though cryptocurrencies cannot comply with present legislation. The world is gradually adopting blockchain-based technologies, which are part of the digital infrastructure. Using the blockchain to create non-fungible tokens is another novel use. The DLT ensures that digital commodities, including music, films, and artwork, cannot be duplicated, or transferred. A virtual world sometimes referred to as the

Metaverse, is a computer simulation of the physical universe. With VR headgear, users may engage in social activities and get engaged in their daily responsibilities. The covid-19, a prototypical instance of the "metaverse," demanded that everyone remains inside and does all activities online. It was revealed that blockchain technology is disruptive to conventional enterprises. These blockchain developments are all connected to cryptocurrency. In NFTs and the Metaverse, the only method to exchange currency is with a cryptocurrency. The decentralized structure of blockchain has facilitated the development of a variety of real-time businesses. Future applications of blockchain technology are almost limitless. As the blockchain revolution gains steam, financial institutions and Fintech companies will confront new challenges, and firms that use the new technology successfully will have a competitive advantage.

Ethical issue

The author is aware of and complies with best practices in publication ethics, specifically with regard to authorship (avoidance of guest authorship), dual submission, manipulation of figures, competing interests, and compliance with policies on research ethics. The author adheres to publication requirements that the submitted work is original and has not been published elsewhere.

Data availability statement

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

Conflict of interest

The author declares no potential conflict of interest.

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